Claim Amendments

Please amend claims 1, 5, 12 and 17 as follows:

1. (currently amended) A method of fabricating a fuel activation assembly for use in a fuel cell, the fuel cell comprising a first cell compartment for containing a reactant and a second cell compartment for containing an oxidant, wherein the fuel activation assembly is disposed between the first cell compartment and the second cell compartment so as to activate the reactant for producing protons in the first cell compartment and for channeling the protons to the second cell compartment, said method comprising the steps of:

providing a substantially planar substrate in the fuel cell, the substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures made through the first surface and the second surface, wherein each of the apertures has a step-like recess; and

securely attaching a plurality of membrane electrode assembly segments to the substrate over the apertures such that each of the membrane electrode assembly segments is attached in the recess of one aperture so that each membrane electrode assembly segment can be independently and separately replaced if needed, and wherein each membrane electrode assembly segment ~~comprising~~ comprises a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment has a first side and an opposing second side, the second side adjacent to the second cell compartment, the first side adjacent to the first cell compartment for activating the reactant in order to produce the protons and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments.

2. (previously presented) The method of claim 1, wherein said attaching is achieved by a heat bonding process, creating a barrier separating the first side from the second side of each membrane electrode segment, thereby preventing the reactant from entering the second cell compartment and the oxidant from entering the first cell compartment.

3. (previously presented) The method of claim 1, wherein said attaching is achieved by applying an adhesive layer between the substrate and the membrane electrode assembly segments,

creating a barrier separating the first side from the second side of each membrane electrode segment, thereby preventing the reactant from entering the second cell compartment and the oxidant from entering the first cell compartment.

4. (previously presented) The method of claim 3, wherein the reactant comprises substantially a mixture of water and alcohol, and the adhesive layer is resistant to water and alcohol.

5. (currently amended) A fuel cell comprising:

a first cell compartment for containing a reactant;

a second cell compartment for containing an oxidant; and

a fuel activation assembly disposed between the first cell compartment and the second cell compartment, the fuel activation assembly comprising:

a substantially planar substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures made through the first surface and the second surface, wherein each of the apertures has a step-like recess; and

a plurality of membrane electrode assembly segments securely attached to the substrate over the apertures such that each of the membrane electrode assembly segments is attached in the recess of one aperture so that each membrane electrode assembly segment can be independently and separately replaced if needed, each of the membrane electrode assembly segment comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment has a first side and an opposing second side, the second side adjacent the second cell compartment, the first side adjacent the first cell compartment for activating the reactant to produce protons in an activation process and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments.

6. (original) The fuel cell of claim 5, wherein the activation process produces an electrical current, said fuel cell further comprising

a first electrically conducting terminal operatively connected to the first cell compartment; and

a second electrically conducting terminal operatively connected to the second cell compartment, so as to allow a current load to connect to the first and second electrically conducting terminals to use the electrical current.

7. (previously presented) The fuel cell of claim 5, wherein the reactant comprises substantially a mixture of water and alcohol, and the substrate is resistant to water and alcohol.

8. (original) The fuel cell of claim 7, wherein the alcohol comprises substantially methanol.

9. (previously presented) The fuel cell of claim 7, wherein the oxidant comprises substantially air.

10. (original) The fuel cell of claim 5, wherein each membrane electrode assembly segment comprises a proton exchange membrane disposed between two electrode layers.

11. (original) The fuel cell of claim 10, wherein each membrane electrode assembly segment further comprises two diffusion layers, each covering one of the electrode layers.

12. (currently amended) A membrane electrode assembly for use in a fuel cell, the fuel cell comprising:

a first cell compartment containing a reactant; and

a second cell compartment containing an oxidant, said membrane electrode assembly comprising:

a substantially planar substrate having a first surface, an opposing second surface, and a plurality of apertures made through the first and second surfaces, wherein each of the apertures has a step-like recess; and

a plurality of fuel activation segments securely attached to the substrate over the apertures such that each of the membrane electrode assembly segments is attached in the recess of one aperture so that each membrane electrode assembly segment can be independently and

separately replaced if needed,, each of the fuel activation segment comprising a proton-exchange membrane sandwiched between two activation layers, wherein each fuel activation segment has a first side and an opposing second side, the second side adjacent the second cell compartment, the first side adjacent the first cell compartment, for activating the reactant in order to produce protons in an activation process, and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments.

13. (original) The membrane electrode assembly of claim 12, wherein each fuel activation segment comprises:

a first electrode layer on the first side;

a second electrode layer on the second side; and

a proton exchange membrane disposed between the first and second electrode layers.

14. (original) The membrane electrode assembly of claim 13, wherein the first electrode layer and the second electrode layer of each fuel activation segment are operatively connected to the first electrode layer and the second electrode layer, respectively, of other fuel active segments such that the fuel activation segments are electrically connected in parallel.

15. (original) The membrane electrode assembly of claim 13, wherein at least some of the fuel activation segments are electrically connected in series, such that the first electrode layer and the second electrode layer of each of said at least some of the fuel activation segments are operatively connected to different ones of the first and second electrode layers of different fuel activation segments.

16. (original) The membrane electrode assembly of claim 13, wherein the fuel activation segments are electrically connected in a combination of a series connection and a parallel connection.

17. (currently amended) A portable electronic device comprising:

an electronic unit for processing signals or data; and

a fuel cell for providing electricity to the electronic unit, the fuel cell comprising:

a first cell compartment containing a reactant;

a second cell compartment containing an oxidant; and

a fuel activation assembly disposed between the first cell compartment and the second cell compartment, the fuel activation assembly comprising:

a substantially planar substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures made through the first and second surfaces, wherein each of the apertures has a step-like recess; and

a plurality of membrane electrode assembly segments securely attached to the substrate over the apertures such that each of the membrane electrode assembly segments is attached in the recess of one aperture so that each membrane electrode assembly segment can be independently and separately replaced if needed, each of the membrane electrode assembly segment comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment has a first side and an opposing second side, the second side adjacent the second cell compartment, the first side adjacent the first cell compartment, for activating the reactant in order to produce protons in an activation process and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments.

18. (original) The portable electronic device of claim 17, comprising a notebook computer.

19. (original) The portable electronic device of claim 17, comprising a laptop computer.

20. (original) The portable electronic device of claim 17, comprising a tablet computer.

21. (original) The portable electronic device of claim 17, comprising a personal digital assistant device.